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मानक

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IS 14803-1 (2000): Plain Bearings, Part 1: Fits [PGD 13: Bearing]



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“Knowledge is such a treasure which cannot be stolen”



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IS 14803 (Part 1) : 2000

ISO 12129-1 : 1995

( Reaffirmed 2005 )

भारतीय मानक  
सादे बेयरिंग  
भाग 1 उपयुक्तताएँ

*Indian Standard*  
**PLAIN BEARINGS**  
**PART 1 FITS**

ICS 21.100.10

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**BUREAU OF INDIAN STANDARDS**  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

June 2000

**Price Group 3**

NATIONAL FOREWORD

This Indian Standard (Part 1) which is identical with ISO 12129-1:1995 ‘Plain bearings—Part 1: Fits’ issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Plain Bearings Sectional Committee and approval of the Light Mechanical Engineering Division Council.

This standard is being published in two parts. The other part of the standard is:

IS 14803 (Part 2) : 2000/ISO 12129-2 : 1995 Plain bearings: Part 2 Tolerances on form and position and surface roughness for shafts, flanges and thrust collars

The text of ISO standard has been approved as suitable for publication as Indian Standard without deviations. Certain conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words ‘International Standard’ appear referring to this standard, they should be read as ‘Indian Standard’.
- b) Comma ( , ) has been used as a decimal marker while in Indian Standards, the current practice is to use a point ( . ) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their places are listed below along with their degree of equivalence for the editions indicated:

| <i>International Standard</i>                                                                                                          | <i>Corresponding Indian Standard</i>                                                                                                                                 | <i>Degree of Equivalence</i> |
|----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| ISO 286-1 :1988 ISO system of limits and fits – Part 1 : Bases of tolerances, deviations and fits                                      | IS 919 (Part 1):1993 ISO system of limits and fits: Part 1 Bases of tolerances, deviations and fits ( <i>second revision</i> )                                       | Identical                    |
| ISO 286-2 :1988 ISO system of limits and fits – Part 2 : Tables of standard tolerance grades and limit deviations for holes and shafts | IS 919 (Part 2) :1993 ISO system of limits and fits : Part 2 Tables of standard tolerance grades and limit deviations for holes and shafts ( <i>first revision</i> ) | do                           |

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of test or analysis, shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

# Indian Standard

## PLAIN BEARINGS

### PART 1 FITS

## 1 Scope

This part of ISO 12129 specifies a system of fits applicable to metallic plain bearings used in general engineering for mean relative bearing clearances  $\psi_m$  of 0,56 % up to 3,15 %.

This system of fits is not applicable to half-bearings and bushes which, due to their special characteristics, are not measured by diameter but by wall thickness, and which are dimensionally changed on assembly.

This part of ISO 12129 is applicable preferably to rotating machine parts and shafting, but it may be used similarly in other ranges of application.

This part of ISO 12129 has been established because it is not possible to use the ISO deviations given in ISO 286-1 and ISO 286-2 to develop clearance fits which correspond to the requirements of plain bearing engineering for approximately uniform mean relative bearing clearances for all nominal size ranges.

Other clearance ranges may be used depending upon the requirements in specific applications.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 12129. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 12129 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of

IEC and ISO maintain registers of currently valid International Standards.

ISO 286-1:1988, *ISO system of limits and fits — Part 1: Bases of tolerances, deviations and fits.*

ISO 286-2:1988, *ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts.*

## 3 System of fits

The system of fits specified in this part of ISO 12129 is a normal system of fits, in which the tolerance zone H of the bearing bore is in accordance with ISO 286-2. The tolerance zone of the shaft is correlated to correspond to the mean relative bearing clearance  $\psi_m$ .

## 4 Mean relative bearing clearance

The mean relative bearing clearance  $\psi_m$ , in per mill (%), of a range of nominal dimensions is given by

$$\psi_m = \frac{S_m}{D_m}$$

where

$S_m$  is the mean absolute bearing clearance, in micrometres

$$S_m = \frac{\text{max. clearance} + \text{min. clearance}}{2}$$

$D_m$  is the arithmetic mean of the range of nominal dimensions, in millimetres.

## 5 Tolerance zones

### 5.1 Size

The size of the tolerance zones is chosen so that for a uniform mean relative bearing clearance  $\psi_m$ , in each case from the minimum to the maximum range of nominal dimensions, an approximately uniform maximum deviation from the relative bearing clearance within a tolerance zone is not exceeded. The lower limit is dictated by economy and methods of production.

The tolerance zone of the shaft in each case is smaller by one IT (basic tolerance in accordance with ISO 286-1) than the tolerance zone of the correlated bearing bore.

### 5.2 Position

The position of the tolerance zone relative to the zero line is determined by the mean relative bearing clearance  $\psi_m$ .

### 5.3 Number

Each of the following values of  $\psi_m$ , in per mill, corresponds to one tolerance zone:

0,56; 0,8; 1,12; 1,32; 1,6; 1,9; 2,24; 3,15.

### 5.4 Symbol

The symbol for the mean relative bearing clearance is  $\psi_m$ . In view of the method of lettering with data processing and on typewriters, the letters PSI are used instead of the Greek letter  $\psi$ .

## 6 Ranges of nominal dimensions

The ranges of nominal dimensions are more closely stepped than in ISO 286-2 so that the maximum deviation from the mean relative bearing clearance  $\psi_m$  can be more closely adhered to.

## 7 Deviations

The deviations for the shafts are given in table 1.

## 8 Minimum and maximum clearances

The minimum and maximum clearances between the shaft and bearing bore, together with the deviations for the shaft which are required for the calculation of the plain bearings, are given in table 1.

## 9 Example

Shaft fit dimension 200 mm for a mean bearing clearance  $\psi_m = 1,12 \text{ ‰}$ .

Ø200PSI 1,12

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| Nominal dimension range<br>mm |                 | Deviations for the shaft 1)           |       |       |       |       |       |       |       | Maximum and minimum clearances between shaft and bearing bore 2) |     |      |      |     |     |      |      |
|-------------------------------|-----------------|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|------------------------------------------------------------------|-----|------|------|-----|-----|------|------|
| over                          | up to and incl. | $\mu\text{m}$                         |       |       |       |       |       |       |       | $\mu\text{m}$                                                    |     |      |      |     |     |      |      |
|                               |                 | Mean relative clearance, $\psi_m$ , ‰ |       |       |       |       |       |       |       | Mean relative clearance, $\psi_m$ , ‰                            |     |      |      |     |     |      |      |
|                               |                 | 0,56                                  | 0,8   | 1,12  | 1,32  | 1,6   | 1,9   | 2,24  | 3,15  | 0,56                                                             | 0,8 | 1,12 | 1,32 | 1,6 | 1,9 | 2,24 | 3,15 |
| 25                            | 30              | —                                     | — 15  | — 23  | — 29  | — 37  | — 45  | — 51  | — 76  | —                                                                | 30  | 38   | 44   | 52  | 60  | 73   | 98   |
|                               |                 | —                                     | — 21  | — 29  | — 35  | — 43  | — 51  | — 60  | — 85  | —                                                                | 15  | 23   | 29   | 37  | 45  | 51   | 76   |
| 30                            | 35              | —                                     | — 17  | — 27  | — 34  | — 43  | — 48  | — 59  | — 89  | —                                                                | 35  | 45   | 52   | 61  | 75  | 86   | 116  |
|                               |                 | —                                     | — 24  | — 34  | — 41  | — 50  | — 59  | — 70  | — 100 | —                                                                | 17  | 27   | 34   | 43  | 48  | 59   | 89   |
| 35                            | 40              | — 12                                  | — 21  | — 33  | — 36  | — 47  | — 58  | — 71  | — 105 | 30                                                               | 39  | 51   | 63   | 74  | 85  | 98   | 132  |
|                               |                 | — 19                                  | — 28  | — 40  | — 47  | — 58  | — 69  | — 82  | — 116 | 12                                                               | 21  | 33   | 36   | 47  | 58  | 71   | 105  |
| 40                            | 45              | — 14                                  | — 25  | — 34  | — 43  | — 55  | — 67  | — 82  | — 120 | 31                                                               | 43  | 61   | 70   | 82  | 94  | 109  | 147  |
|                               |                 | — 21                                  | — 32  | — 45  | — 54  | — 66  | — 78  | — 93  | — 131 | 14                                                               | 25  | 34   | 43   | 55  | 67  | 82   | 120  |
| 45                            | 50              | — 18                                  | — 25  | — 40  | — 50  | — 63  | — 77  | — 93  | — 136 | 36                                                               | 52  | 67   | 76   | 90  | 104 | 120  | 163  |
|                               |                 | — 25                                  | — 36  | — 51  | — 60  | — 74  | — 88  | — 104 | — 147 | 18                                                               | 25  | 40   | 49   | 63  | 77  | 93   | 136  |
| 50                            | 55              | — 19                                  | — 26  | — 43  | — 53  | — 68  | — 84  | — 102 | — 149 | 40                                                               | 58  | 75   | 85   | 100 | 116 | 144  | 181  |
|                               |                 | — 27                                  | — 39  | — 56  | — 66  | — 81  | — 97  | — 115 | — 162 | 19                                                               | 26  | 43   | 53   | 68  | 84  | 102  | 149  |
| 55                            | 60              | — 22                                  | — 30  | — 48  | — 60  | — 76  | — 93  | — 113 | — 165 | 43                                                               | 62  | 80   | 92   | 108 | 125 | 145  | 197  |
|                               |                 | — 30                                  | — 43  | — 61  | — 73  | — 89  | — 106 | — 126 | — 178 | 22                                                               | 30  | 48   | 60   | 76  | 93  | 113  | 165  |
| 60                            | 70              | — 20                                  | — 36  | — 57  | — 70  | — 80  | — 99  | — 121 | — 180 | 53                                                               | 68  | 90   | 102  | 129 | 148 | 170  | 229  |
|                               |                 | — 33                                  | — 49  | — 70  | — 83  | — 99  | — 118 | — 140 | — 199 | 20                                                               | 36  | 57   | 70   | 80  | 99  | 121  | 180  |
| 70                            | 80              | — 26                                  | — 44  | — 60  | — 75  | — 96  | — 118 | — 144 | — 212 | 58                                                               | 76  | 109  | 124  | 145 | 167 | 193  | 261  |
|                               |                 | — 39                                  | — 57  | — 79  | — 94  | — 115 | — 137 | — 162 | — 231 | 26                                                               | 44  | 60   | 75   | 96  | 118 | 144  | 212  |
| 80                            | 90              | — 29                                  | — 50  | — 67  | — 84  | — 108 | — 133 | — 162 | — 239 | 66                                                               | 87  | 124  | 141  | 165 | 190 | 219  | 296  |
|                               |                 | — 44                                  | — 65  | — 89  | — 106 | — 130 | — 155 | — 184 | — 261 | 29                                                               | 50  | 67   | 84   | 108 | 133 | 162  | 239  |
| 90                            | 100             | — 35                                  | — 58  | — 78  | — 97  | — 124 | — 152 | — 184 | — 271 | 72                                                               | 95  | 135  | 154  | 181 | 209 | 241  | 328  |
|                               |                 | — 50                                  | — 73  | — 100 | — 119 | — 146 | — 174 | — 206 | — 293 | 35                                                               | 58  | 78   | 97   | 124 | 152 | 184  | 271  |
| 100                           | 110             | — 40                                  | — 56  | — 89  | — 110 | — 140 | — 171 | — 207 | — 302 | 77                                                               | 113 | 146  | 167  | 197 | 228 | 264  | 359  |
|                               |                 | — 55                                  | — 78  | — 111 | — 132 | — 162 | — 193 | — 229 | — 324 | 40                                                               | 56  | 89   | 110  | 140 | 171 | 207  | 302  |
| 110                           | 120             | — 36                                  | — 64  | — 100 | — 122 | — 156 | — 190 | — 229 | — 334 | 93                                                               | 121 | 157  | 180  | 213 | 247 | 286  | 391  |
|                               |                 | — 60                                  | — 86  | — 122 | — 145 | — 178 | — 212 | — 251 | — 356 | 36                                                               | 64  | 100  | 122  | 156 | 190 | 229  | 334  |
| 120                           | 140             | — 40                                  | — 72  | — 113 | — 139 | — 176 | — 215 | — 259 | — 377 | 105                                                              | 137 | 178  | 204  | 241 | 280 | 324  | 442  |
|                               |                 | — 65                                  | — 97  | — 138 | — 164 | — 201 | — 240 | — 284 | — 402 | 40                                                               | 72  | 113  | 139  | 176 | 215 | 259  | 377  |
| 140                           | 160             | — 52                                  | — 88  | — 136 | — 166 | — 208 | — 253 | — 304 | — 440 | 117                                                              | 153 | 201  | 231  | 273 | 318 | 369  | 505  |
|                               |                 | — 77                                  | — 113 | — 161 | — 191 | — 233 | — 278 | — 329 | — 465 | 52                                                               | 88  | 136  | 166  | 208 | 253 | 304  | 440  |
| 160                           | 180             | — 63                                  | — 104 | — 158 | — 192 | — 240 | — 291 | — 348 | — 503 | 128                                                              | 179 | 223  | 257  | 305 | 356 | 413  | 568  |
|                               |                 | — 88                                  | — 129 | — 183 | — 217 | — 265 | — 316 | — 373 | — 528 | 63                                                               | 104 | 158  | 192  | 240 | 291 | 348  | 503  |
| 180                           | 200             | — 69                                  | — 115 | — 175 | — 213 | — 267 | — 324 | — 388 | — 561 | 144                                                              | 190 | 250  | 288  | 342 | 399 | 463  | 636  |
|                               |                 | — 98                                  | — 144 | — 204 | — 242 | — 296 | — 353 | — 417 | — 590 | 69                                                               | 115 | 175  | 213  | 267 | 324 | 388  | 581  |
| 200                           | 225             | — 82                                  | — 133 | — 201 | — 243 | — 303 | — 366 | — 439 | — 632 | 157                                                              | 208 | 276  | 318  | 378 | 441 | 514  | 707  |
|                               |                 | — 111                                 | — 162 | — 230 | — 272 | — 332 | — 395 | — 468 | — 661 | 82                                                               | 133 | 201  | 243  | 303 | 366 | 439  | 632  |
| 225                           | 250             | — 96                                  | — 153 | — 229 | — 276 | — 343 | — 414 | — 495 | — 711 | 171                                                              | 228 | 304  | 351  | 418 | 489 | 570  | 786  |
|                               |                 | — 125                                 | — 182 | — 258 | — 305 | — 372 | — 443 | — 524 | — 740 | 96                                                               | 153 | 229  | 276  | 343 | 414 | 495  | 711  |

Table 1

|       |       |                |                |                    |                    |                    |                    |                    |                    |            |              |                |                |                |                |                |                |
|-------|-------|----------------|----------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|------------|--------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 250   | 280   | - 106<br>- 138 | - 170<br>- 202 | - 255<br>- 287     | - 308<br>- 340     | - 382<br>- 414     | - 462<br>- 494     | - 552<br>- 584     | - 793<br>- 825     | 190<br>106 | 254<br>170   | 339<br>255     | 392<br>308     | 466<br>382     | 546<br>462     | 636<br>552     | 877<br>793     |
| 280   | 315   | - 125<br>- 157 | - 196<br>- 228 | - 291<br>- 323     | - 351<br>- 383     | - 434<br>- 466     | - 523<br>- 555     | - 624<br>- 656     | - 895<br>- 927     | 209<br>125 | 280<br>196   | 375<br>291     | 435<br>351     | 518<br>434     | 607<br>523     | 708<br>624     | 979<br>895     |
| 315   | 355   | - 141<br>- 177 | - 222<br>- 258 | - 329<br>- 365     | - 396<br>- 432     | - 490<br>- 526     | - 590<br>- 626     | - 704<br>- 740     | - 1 009<br>- 1 045 | 234<br>141 | 315<br>222   | 422<br>329     | 489<br>396     | 583<br>490     | 683<br>590     | 799<br>704     | 1 102<br>1 009 |
| 355   | 400   | - 165<br>- 201 | - 256<br>- 292 | - 376<br>- 412     | - 452<br>- 488     | - 558<br>- 594     | - 671<br>- 707     | - 799<br>- 835     | - 1 143<br>- 1 179 | 258<br>165 | 349<br>256   | 469<br>376     | 545<br>452     | 651<br>558     | 764<br>671     | 892<br>799     | 1 236<br>1 143 |
| 400   | 450   | - 187<br>- 227 | - 289<br>- 329 | - 425<br>- 465     | - 510<br>- 550     | - 629<br>- 669     | - 756<br>- 796     | - 901<br>- 941     | - 1 287<br>- 1 327 | 290<br>187 | 392<br>289   | 528<br>425     | 613<br>510     | 732<br>629     | 859<br>756     | 1 004<br>901   | 1 390<br>1 287 |
| 450   | 500   | - 215<br>- 255 | - 329<br>- 369 | - 481<br>- 520     | - 576<br>- 616     | - 709<br>- 749     | - 851<br>- 891     | - 1 013<br>- 1 053 | - 1 445<br>- 1 485 | 318<br>215 | 432<br>329   | 584<br>481     | 679<br>576     | 812<br>709     | 954<br>851     | 1 116<br>1 013 | 1 548<br>1 445 |
| 500   | 560   | - 240<br>- 284 | - 367<br>- 411 | - 537<br>- 581     | - 643<br>- 687     | - 791<br>- 835     | - 950<br>- 994     | - 1 130<br>- 1 174 | - 1 613<br>- 1 657 | 354<br>240 | 481<br>367   | 651<br>537     | 757<br>643     | 905<br>791     | 1 064<br>950   | 1 244<br>1 130 | 1 727<br>1 613 |
| 560   | 630   | - 276<br>- 320 | - 419<br>- 463 | - 609<br>- 653     | - 728<br>- 772     | - 895<br>- 939     | - 1 074<br>- 1 118 | - 1 276<br>- 1 320 | - 1 852<br>- 1 896 | 390<br>276 | 533<br>419   | 723<br>609     | 842<br>728     | 1 009<br>895   | 1 198<br>1 074 | 1 390<br>1 276 | 1 966<br>1 852 |
| 630   | 710   | - 310<br>- 360 | - 471<br>- 521 | - 685<br>- 735     | - 819<br>- 869     | - 1 007<br>- 1 057 | - 1 208<br>- 1 258 | - 1 436<br>- 1 486 | - 2 046<br>- 2 096 | 440<br>310 | 601<br>471   | 815<br>685     | 949<br>819     | 1 137<br>1 007 | 1 338<br>1 208 | 1 566<br>1 436 | 2 176<br>2 046 |
| 710   | 800   | - 358<br>- 408 | - 539<br>- 589 | - 781<br>- 831     | - 932<br>- 982     | - 1 143<br>- 1 193 | - 1 370<br>- 1 420 | - 1 626<br>- 1 676 | - 2 313<br>- 2 363 | 488<br>358 | 669<br>539   | 911<br>781     | 1 062<br>932   | 1 273<br>1 143 | 1 500<br>1 370 | 1 756<br>1 626 | 2 443<br>2 313 |
| 800   | 900   | - 403<br>- 459 | - 607<br>- 663 | - 879<br>- 935     | - 1 049<br>- 1 105 | - 1 287<br>- 1 343 | - 1 542<br>- 1 598 | - 1 831<br>- 1 887 | - 2 605<br>- 2 661 | 549<br>403 | 753<br>607   | 1 025<br>879   | 1 195<br>1 049 | 1 433<br>1 287 | 1 688<br>1 542 | 1 977<br>1 831 | 2 751<br>2 605 |
| 900   | 1 000 | - 459<br>- 515 | - 687<br>- 743 | - 991<br>- 1 047   | - 1 181<br>- 1 237 | - 1 447<br>- 1 503 | - 1 732<br>- 1 788 | - 2 055<br>- 2 111 | - 2 920<br>- 2 976 | 605<br>459 | 833<br>687   | 1 137<br>991   | 1 327<br>1 181 | 1 593<br>1 447 | 1 878<br>1 732 | 2 201<br>2 055 | 3 066<br>2 920 |
| 1 000 | 1 120 | - 508<br>- 574 | - 763<br>- 829 | - 1 102<br>- 1 168 | - 1 314<br>- 1 380 | - 1 611<br>- 1 677 | - 1 929<br>- 1 995 | - 2 289<br>- 2 355 | - 3 254<br>- 3 320 | 679<br>508 | 934<br>763   | 1 273<br>1 102 | 1 485<br>1 314 | 1 782<br>1 611 | 2 100<br>1 929 | 2 460<br>2 289 | 3 425<br>3 254 |
| 1 120 | 1 250 | - 578<br>- 644 | - 863<br>- 929 | - 1 242<br>- 1 308 | - 1 479<br>- 1 545 | - 1 811<br>- 1 877 | - 2 166<br>- 2 232 | - 2 569<br>- 2 635 | - 3 647<br>- 3 713 | 749<br>578 | 1 034<br>863 | 1 413<br>1 242 | 1 650<br>1 479 | 1 982<br>1 811 | 2 337<br>2 166 | 2 740<br>2 569 | 3 818<br>3 647 |

1) The deviations of the shaft correspond to IT4 above the upper bold stepped line, to IT5 between the stepped lines, and to IT6 below the lower bold stepped line.

2) The maximum and minimum clearances correspond to IT4/H 5 for the fit shaft/bearing bore above the upper bold stepped line, to IT5/H 6 between the bold stepped lines, and to IT6/H 7 below the lower bold stepped line.

## Bureau of Indian Standards

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### Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Handbook' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc: No. LM 11 (0424).

### Amendments Issued Since Publication

| Amend No. | Date of Issue | Text Affected |
|-----------|---------------|---------------|
|           |               |               |
|           |               |               |
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## BUREAU OF INDIAN STANDARDS

### Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002  
Telephones: 323 01 31, 323 3375, 323 94 02

Telegrams: Manaksanstha  
(Common to all offices)

### Regional Offices:

|                                                                                                                                                                                                  | Telephone                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg<br>NEW DELHI 110002                                                                                                                            | 323 76 17, 323 38 41                           |
| Eastern : 1/14 C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi<br>CALCUTTA 700054                                                                                                                  | { 337 84 99, 337 85 61<br>337 86 26, 337 91 20 |
| Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022                                                                                                                                           | { 60 38 43<br>60 20 25                         |
| Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600113                                                                                                                                          | { 235 02 16, 235 04 42<br>235 15 19, 235 23 15 |
| Western : Manakalaya, E9 MIDC, Marol, Andheri (East)<br>MUMBAI 400093                                                                                                                            | { 832 92 95, 832 78 58<br>832 78 91, 832 78 92 |
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